Volcanoes on Io: Silicate Flows and Fire Fountains

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Some of the thermal outbursts on the Jovian satellite Io, the most volcanically active body in the Solar System, have been interpreted as manifestations of silicate volcanism. The results of modelling the large Loki thermal outburst of 9^{th} January 1990 and other Io thermal events are presented. The 1990 Loki Patera outburst has been interpreted as a predominantly silicate eruption (Blaney et al., 1995, Icarus, 113, 220-225) having two components (Davies, 1996, Icarus, in press), a flow unit and a hot region, interpreted as a zone of silicate fire fountains. The eruption model predicts only a relatively small areal extent of the fire fountain zone and flow units, an area which if circular would have a diameter of 40 km. This is on a satellite where deposits from other styles of eruption can cover $>8 \times 10^8$ km^2 (eg, Pele). Images released from the Galileo SSI, tend to confirm this hypothesis showing that there is little apparent large-scale change in the Loki region of Io, historically the most thermally active area on Io, especially when compared with large changes in albedo and surface units in, for example, the Ra Patera region.

Therefore, the lack of change in the Loki region is more in character with areally small-scale but hot ($>$ 1000 K, and therefore silicate) volcanic activity rather than larger-scale but cooler (S, SO_2) styles of volcanic activity.

Understanding volcanism on Io will be greatly aided by data from the Galileo NIMS (Near Infrared Mapping Spectrometer) which will yield both compositional and thermal information about the surface geologic units of Io. It is intended that analyses of data collected during the G2 encounter will also be presented.

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